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| 10/075,289      | 02/15/2002  | Sylvie Lesmanne      | T2147-907715        | 9018             |

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MILES & STOCKBRIDGE PC  
1751 PINNACLE DRIVE  
SUITE 500  
MCLEAN, VA 22102-3833

EXAMINER

VERBRUGGE, KEVIN

ART UNIT

PAPER NUMBER

2189

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/075,289

Applicant(s)

LESMANNE ET AL.

Examiner

Kevin Verbrugge

Art Unit

2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/7/04 has been entered.

### ***Response to Amendment***

The amendment submitted 6/7/04 amended claims 1-3 and 10-12. Claims 1-12 are pending. The RCE mentioned above was filed on 9/3/04 but was not properly processed. As a result, the case was not immediately classified as an "amended case" but rather remained classified as a rejected case. Then in January of 2005, Examiner Thang Ho left the Office and this case was assigned to the Examiner listed below. Upon looking through the rejected cases transferred from Examiner Ho to the Examiner below, the Examiner below noticed that the current case was not a rejected case per se, awaiting a response, but actually an amended case since an RCE had been filed requesting entry of the previously filed amendment. Upon noticing this fact, the Examiner got the case classified properly and is hereby acting on the amendment. The Office regrets any delay caused by this misclassification.

### ***Invention Summary***

As a preliminary matter, the Examiner will here describe the invention as disclosed on page 7 of the specification with particular attention to the cache filter directory 84, shown in Fig. 2.

Paragraph 0027 on page 7 of the specification mentions cache filter directory 84 (first sentence) and cache filter directory 84 SF/ED (last sentence). This is understood to be a directory having multiple entries, although only one entry is shown in Fig. 2, presumably for simplicity. The shown entry includes address 85, presence vector 86, remote presence extension 88, and exclusive memory status bit 87. As taught by Applicant at the last sentence of paragraph 0027, "the cache filter directory 84 SF/ED is created by the merging of filter directories SF and ED", which are described in paragraph 0026. Presumably filter directory SF includes multiple presence vectors 86 and forms the basis for the claimed cache filter directory including a first filter directory (claim 1) and the local cache filter directory (claim 10). Similarly, filter directory ED presumably includes multiple remote presence extensions 88 and forms the basis for the claimed complementary filter directory (claim 1) and the complementary cache filter directory (claim 10).

Each module has a single coherence controller 64. That coherence controller includes the cache filter directory 84 which includes presence vector 86 and remote presence extension 88.

Importantly, the bits of presence vector 86 are used to indicate that a particular multiprocessor of the same module as the coherence controller containing the presence

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vector 86 has a coherence situation, namely one or more of the caches of the multiprocessor has a copy of data from the memory of the multiprocessor. In other words, since each bit of presence vector 86 refers to a single multiprocessor, if the bit is set to equal "1" for example, then some cache within that multiprocessor contains a copy of data from the memory of that multiprocessor (see the second sentence of paragraph 0027).

Additionally, the bits of remote presence extension 88 are used to indicate that a piece of data from the memory of one of the multiprocessors of the current module has been stored in a cache of a different module. In other words, since each bit of remote presence extension 88 refers to a single module, if the bit is set to equal "1" for example, then some cache within a multiprocessor of the referenced remote module contains a copy of data from the memory of one of the multiprocessors of the current module (see the third sentence of paragraph 0027).

The first coherency directory (made up of presence vectors 86) enables tracking of the fact that data has been copied from a memory within a multiprocessor to at least one cache within that same multiprocessor.

Similarly, the second coherency directory (made up of remote presence extensions 88) enables tracking of the fact that data has been copied from a memory within a multiprocessor of the current module to at least one cache in a multiprocessor of another module.

There is no disclosure of any tracking of data copying between multiprocessors within the same module.

This characterization of the Applicant's invention is obtained from a careful reading of the specification and the drawings and forms the basis for the rejections below. If Applicant disagrees with the characterization, such disagreement must be carefully explained.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 3, 10, and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In claim 1, lines 1-4, the literal language of the claims requires a coherence controller in each of the local module and the plurality of remote modules to be capable of being connected to a plurality of multiprocessors within the local module. This means a coherence controller in each remote module is capable of being connected to the multiprocessors in the local module. Clearly this is not shown in Fig. 2 or in the specification. Instead, what is supported is the coherence controller of each module being capable of being connected to a plurality of multiprocessors within the same

module as the coherence controller. Replacing "local module" in line 4 with --same module as the coherence controller-- would overcome this rejection.

Similarly in line 9, "local module" should be replaced with --same module as the coherence controller-- since the disclosure is not enabling for a cache filter directory in a remote module guaranteeing coherence between the main memory and the caches of the local module.

Similarly in line 11, "copied from the local module into at least one remote module" should be replaced with --copied from the same module as the coherence controller into at least one other module-- since the disclosure does not support a coherence controller of a remote module tracking data copied from the local module to a remote module.

Similarly in line 13, "local module and said at least one remote module" should be replaced with --same module as the coherence controller and said at least one other module-- since the disclosure does not support a coherence controller of a remote module tracking data copied from the local module to a remote module.

Finally, in line 14, "remote module" should be changed to --other module-- to reflect the above changes.

In claim 2, "local module" should be replaced with --same module as the coherence controller-- since the disclosure is not enabling for a presence vector in a remote module referring to the multiprocessors in the local module.

Similarly, in line 6, "remote" should be deleted since the modules connected to a remote module include the local module.

In claim 3, "remote" should be changed to --other-- since a remote module may be connected to the local module.

In claim 10, lines 8, 9 (first two occurrences), 10, and 12, the word "local" should be removed since the specification does not support the presence of a "local coherence controller" in a remote module.

In line 11, "said remote" should be changed to --the other-- since the disclosure does not support connecting a remote module to another module if there is only a local module and a remote module.

In the last line, "remote" should be changed to --other-- to reflect the above change.

In claim 11, next to last line, "remote" should be changed to --other-- to reflect the above change.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.



Claims 1, 2, and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the local main memory" in line 8. There is insufficient antecedent basis for this limitation in the claim. Since each coherence controller is connected to a plurality of multiprocessors and each multiprocessor includes a local main memory, there are a plurality of local main memories associated with each coherence controller. It is not clear which local memory is being referenced. Presumably what Applicant intends is "a cache filter directory including a first filter directory for guaranteeing, for each multiprocessor, coherence between the local main memory and the cache memory in each of the processors" because the bits MP0-MP3 in presence vector 86 guarantee coherence for individual multiprocessors.

Claim 1 recites the limitation "the local main memory" in lines 10-11. There is insufficient antecedent basis for this limitation in the claim. Since each coherence controller is connected to a plurality of multiprocessors and each multiprocessor includes a local main memory, there are a plurality of local main memories associated with each coherence controller. It is not clear which local memory is being referenced. Presumably what Applicant intends is "a complementary filter directory for tracking locations of lines or blocks of a local main memory".

Claim 1 recites the limitation "the local main memory" in lines 12. There is insufficient antecedent basis for this limitation in the claim. Since each coherence

controller is connected to a plurality of multiprocessors and each multiprocessor includes a local main memory, there are a plurality of local main memories associated with each coherence controller. It is not clear which local memory is being referenced. Presumably what Applicant intends is “guaranteeing coherence between the local main memory and the cache in each of the processors of one of the multiprocessors”.

Claim 2 recites “an ‘n-1’-bit extension of the presence vector, where n-1 is ...”. This implies the same “n” as in line 3, so --N-1-- should be used as in the specification where referring to the number of remote modules.

Claim 11 recites “an ‘n-1’-bit extension of the presence vector”. This implies the same “n” as in line 3, so --N-1-- should be used as in the specification where referring to the number of remote modules.

### ***Careful Review***

After making the above changes, Applicant is requested to carefully review all claims for their compliance with 35 USC 112 and their consistency within and between claims.

### ***Allowable Subject Matter***

Claims 1 and 10 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

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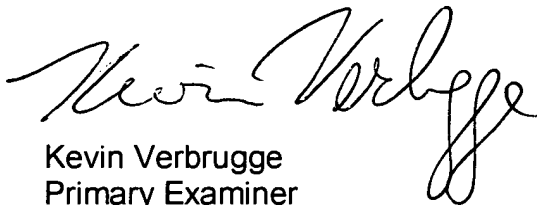
Claims 2-9, 11, and 12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Conclusion***

Any inquiry concerning a communication from the Examiner should be directed to the Examiner by phone at (571) 272-4214.

Any response to this action should be labeled appropriately (including serial number, Art Unit 2189, and type of response) and mailed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, hand-carried or delivered to the Customer Service Window at Randolph Building, 401 Dulany Street, Alexandria, VA 22313, or faxed to (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197.



Kevin Verbrugge  
Primary Examiner  
Art Unit 2189